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RETURN RECEIPT REQUESTED

Mr. Barry L. Pickard, P.E. Pisot Englover Environmental Systems General Electric Company Electronics Pert, Buliding 9 Syracuse, New York 13821

Res General Electric Company Res

dear Mr. Pickard:

The Environmental Frotection Agancy (EPA) has completed the initial review of the Resource Conservation and Recovery Act (RCRA) permit application of the Resource Conservation (DEC), for General Electric's Liverpool, New York Techlity, with the assistance of the New York State Department of Environmental Conservation (DEC), of the New York State Department of Environmental Conservation (DEC), has a result of this review, we have determined that the application is incomplete. The information identified in Attachment I of this letter is incomplete. The information identified in Attachment I of this letter is incomplete. The information dencified in Attachment I of this letter is

Please he aware that failure to submit a complete Part B application in a timely manner may be grounds for the termination of interim status under 40 CFB \$270,10(e){5}(formerly \$122,22(e)(5)), Therefore, the missing information submitted as expeditionaly as possible, information should be completed and submitted as expeditionaly as possible, it is requested that you submit the necessary revisions to your application to requested that your application containing the missing information identified in Attachment I by no later than March 20, 1984.

Your submittal should be addressed to my attention. We also request that you provide three extra copies of the revised portions of the application in order to expedite the processing of this material.

Salva Salvas

If there are any questions concerning the requested information, they should be directed to either Mr. Charles Branagh, DEC, Region 7 Head-quarters at 315/428-4484 or Ms. Catherine Massimino of my staff at 212/264-1317.

Sincerely yours,

Ernest A. Regna Chief Solid Waste Branch

Enclosures

cc: Paul R. Counterman, P.E. Chief, Bureau of Mazardous Waste Technology NYSDEC w/encl.

bcc: R. Baker, PAB w/encl.
S. Lackey, NYSDEC, Region 7 w/encl.

C. Massimino, SWB w/encl.

ATTACHMENT I

General Electric Co. (Electronic Park) EPA I.D. No. NYD059385120

General Comment: Part B application requires a certification with the name, date and acceptable signature (40 CFR 270.11(d)).

I. Part A Application

- 1. GE must indicate the changes made in their original Part A Application. This may be done by enclosing copies of both the original and revised Part A Applications with descriptions of changes made therein in the general facility description section of Part B Application.
- 2. The Application must reconcile the total quantities of each hazardous waste included in item IV of form 3. This reconciliation must show which are the wastes included in each of the EPA hazardous waste numbers shown.

II. General Facility Description

- 1. The process description given is not sufficient. It must identify each waste and a brief description of its generation process. It must also include a brief description of the two waste water treatment plants and the hazardous sludges shipped off-site. Also include a description of the outdoor staging of the drums. (40 CFR 270.14(b)(1))
- 2. The topographic map must contain the following additional information (40 CFR 270.14(b)(19)).
 - (a) The topographic map must extend 1000 feet beyond property lines.
 - (b) All buildings must be labelled.

- (c) The outdoor drum staging area and the underground tank connected to the inflammable storage area must be shown. Even though map II-2B is to a scale 1" = 200', it does not clearly show the actual hazardous waste storage areas and the outdoor staging areas in detail. A revised drawing to a larger scale showing the Chem annex building housing the hazardous waste storage areas with their elevation, under ground tank with their fill pipe elevation and the outdoor staging area elevation and its detail, must be enclosed with the revised application. This is required to evaluate how any spillages in these areas will flow and also the run-on and run-off provisions.
- (d) Loading and unloading facilities and fire control facilities must be shown.
- 3. Federal Insurance Administration (FIA) maps should be included for demonstrating the flood plain standards. If FIA map is not available, other maps can be used with demonstration of an equivalent mapping technique. This map must also indicate the 100 year flood level. (40 CFR 270.14(b)(11)(iii))
- 4. The application must list separately the on-site wastes and off-sites wastes.
- 5. The traffic information in the application should be expanded to include the following:
 - (a) Facility access road's load bearing capacity
 - (b) Types and maximum capacity loaded of the vehicles utilized to transport drums from the Court Street and Farrel Road Plant
 - (c) The maximum capacity loaded of the semitrailer utilized by the disposal vendor for transportation off GE's site

(d) Traffic patterns of drum shipment from the Court Street and

Farrel Road plants (e.g., diagram indicating traffic route and controls)

III. Waste Characteristics

- 1. The waste analysis plan as presented in the application is more or less a reproduction of EPA SW-846 test methods. This is insufficient. As per 40 CFR 264.13 and 270.14(b)(2) the waste analysis must contain all the information which must be known to treat, store or dispose of the waste properly in accordance with Part 264. The waste analysis plan must describe the parameters for which each waste will be analyzed, rationale for its selection, sampling method and analytical procedures with frequency of analysis (40 CFR 264.13(b)).
- The application does not contain waste product records for some of the wastes stored at the facility (shown in Section V.4). These must be included.
- 3. If General Electric proposes to store additional wastes (other than shown Section in V.4), the waste analysis plan must include these additional wastes, also.
- 4. Since the Facility is receiving wastes from off-site, the application must include a plan to inspect each and every shipment. The plan must contain procedures to be followed to completely know the identity of the waste if the waste does not match the information provided on the waste product record (40 CFR 264.13(c)). Records containing all the information obtained during these inspections must be kept at the facility (40 CFR 264.15(d)).

- 5. General Electric must commit to a language that analysis of off-site wastes will be done at least once a year or everytime the generation process changes.
- 6. The application must state what type of waste analysis information is supplied by the generator of off-site wastes.

IV. Process Information

- 1. The process information on containers should describe the different materials of construction and inside liners of drums used for storing different hazardous wastes. This information also must include the method by which the compatibility of the materials of construction and liners with the waste was established (40 CFR 264.172).
- General Electric must clarify that the waste code on the drum label is the same as the master index list number.
- 3. Under container management practices, there is a reference to leaking drums being returned to the generator for redrumming. This practice is unacceptable and unsafe. Any leaking drums must be either overpacked or must be redrummed at the receiving station. General Electric must make correction in the application accordingly.
- 4. Outdoor Staging of Containers: The application must describe the current outdoor staging of hazardous waste drums during their transhipment including its purpose, duration and must address, in detail, all technical requirements of 40 CFR 264.170 264.178 and 40 CFR 270.15 (Formerly 40 CFR 122.25(b)(1)). The attached checklist will be helpful in this area. At present the existing outdoor drum staging area does not meet the requirements of 40 CFR 264.175 for container storage. If GE wants to be permitted to stage drums outdoors, it must provide in its application for the construction of a new outdoor drum staging

area in compliance with 40 CFR 264.170 - 264.178 and 40 CFR 270.15. Specifically the container management section must address the following:

- Must provide complete engineering and construction specifications, drawings and construction schedules for the new outdoor drum staging area, including the secondary containment systems. These must be approved by EPA and NYSDEC before construction is started.
 - i. For the containment system, the drawing must include curbs, berms, elevations, slope, water stops for joints and sumps, sealants, thickness of the base and provisions to prevent runons and for the removal of liquid spills. The base must be free of gaps and sufficiently impervious to contain leaks, spills and accumulated precipitation until removed. Please provide the specifications for the concrete, water stops, sealant and coatings and document the compatibility of these items with the materials stored in the container areas.
 - ii. For the secondary containment system, please provide a description that clearly demonstrates the system's adequacy to hold spills, leaks, run-ons and precipitation until detected and removed.
- b. Drawings showing the dimensions of the storage areas, the number of rows, row length, stack height and width, aisle space and documenting a minimum distance of 50 feet between the containers holding reactive or ignitable wastes and the facility boundary must be provided. The aisle space provided must be sufficient for emergency personnel and equipment to move around during emergencies.

- c. Must demonstrate how the existing outdoor drum staging area meets 40 CFR Part 265 requirements and how the new outdoor drum staging area meets 40 CFR 264.170 264.174 and 40 CFR 264.177 requirements.
 d. Must provide closure plans and schedules for the existing outdoor staging area and the new outdoor drum staging area, including its decontamination.
 The aisle space used for storing drums in the flammable storage area in the sufficient to allow personnel and emergency equipment to move around the present of the contamination.
- 5. The aisle space used for storing drums in the flammable storage area must be sufficient to allow personnel and emergency equipment to move around in emergencies (40 CFR 264.35). Thus 30" aisle space used at present in the above storage is not adequate. This must be increased to at least 36" for hand cart usage.
- 6. Drawings showing the following information on the ignitable storage must be included in the application.
 - (a) Wall construction details
 - (b) Floor construction details (material, sealant and slope).
 - (c) Vent locations and blower capacities.
 - (d) Type of door (fire door) and whether it remains locked always.
 - (e) The containment facility to collect the floor washings into the underground tank.
- 7. Underground tanks which are "enterable for inspection" are covered under existing regulations. Detailed analyses of these tanks including their design drawings in accordance with 264.190 264.199 must be presented if they are to remain in service. A procedure must be submitted for pressure testing these tanks for leaks by the Kent-Moore method (description attached) or equivalent and for assessing these underground tanks for cracks, corrosion, erosion, wall thickness

and cleaning the tanks to allow inspection. Documentation should be provided that the frequency of inspection is adequate based on the construction materials, rates of corrosion and erosion observed, the condition of the tanks and the characteristics of the waste. Results of such comprehensive inspection for each tank should be included in the application, per 40 CFR 264.194(b).

- 8. The process description should include the method and frequency for checking the level of any spilled liquid in the underground tank.
- 9. A drawing of the secondary containment system for the inflammables storage area must be included. A curb must be provided around the inflammable storage area to prevent any runoff into other parts of the Chem Annex building (40 CFR 264.175(b)).

V. Procedures to Prevent Hazards

- 1. In addition to the inspection log, an inspection schedule listing the various items to be checked, the type of problems to be looked into and the frequency of inspection must be included under Section V.2. The inspection log shown in the application must be corrected to conform to the schedule (40 CFR 264.15(a) and (b)).
- The application must state that copies of the inspection schedule and logs are kept at least for three years from the date of inspection (40 CFR 264.15(d)).
- The above inspection schedule must include the periodic inspection of the underground tank for level (daily) and for any structural deterioration (frequency depending upon its material of construction). Loading and unloading areas must be inspected on a daily basis (40 CFR 264.15(b)).

- 4. The inspection schedule also has to include the general inspection of the fire extinguishers, alarms for fire water pressure, safety showers, spill absorbents and personal protective gears (40 CFR 264.15(b)).
- 5. The application must outline the inspection procedures for the underground tank including the method for emptying it and precautions taken before anyone enters it for inspection (40 CFR 264.194).
- 6. The application must describe the remedial actions that will be taken to remedy any problems revealed during inspections (40 CFR 264.15(c)).
- 7. Per 40 CFR 264.32, all hazardous waste management facilities must have an internal communication or alarm system, external communication system for summoning external assistance, fire control equipment and fire water supply. The application must document the existence/availability of these equipment at the facility.
- 8. A description of the absorbents used to contain spills or leaks and their disposal method must be included in Section V.3.
- 9. The application must include precautions taken when the drums are staged outside.

VI. Contingency Plan

- 1. The floor plan mentioned under item VI.4 is missing in the application.

 A copy of this floor plan must be included as part of the contingency plan (40 CFR 264.52 and 264.53).
- A statement authorizing designated emergency coordinators to commit the necessary resources to implement the contingency plan must be included in the application (40 CFR 264.52(d) and 264.55).
- 3. The application must describe the criteria for implementation of the contingency plan (40 CFR 264.52(a) and 264.56(d)).

- 4. The application must describe the methodology for immediate notification of facility personnel and necessary state/local agencies (40 CFR 264.56(a)).
- 5. The functions of the emergency coordinators described in Section V1.5(b) must include the following (40 CFR 264.56):
 - (a) Identifying and quantifying the released material.
 - (b) Assessing possible hazards to human health or environment due to the above release.
 - (c) Advising the local authorities of any need to evacuate local areas.
 - (d) Ensuring the fire or spill does not spread to other areas and collecting/containing spills.
 - (e) Immediately after an emergency, the coordinator must ensure that all recovered waste and contaminated soils are treated, stored and disposed of properly.
 - (f) The emergency coordinator must ensure that all emergency equipment are cleaned and fit for use before operations are resumed.

The description of the emergency coordinator's functions must include the methodology by which each of the above functions will be performed.

- 6. The application must document that any incident requiring the activation of the contingency plan will be recorded and that within fifteen days the owner will submit a written report to the Regional Administrator on the incident per 40 CFR 264.56(i) and (j).
- 7. Per 40 CFR 264.52(e), the contingency plan must include the location, description and capabilities of all emergency equipment available at the facility.

8. An evacuation plan with criteria for evacuation and signals to be used to begin evacuation must be included in the application (40 CFR 264.52(f)).

VII. Personnel Training Program

- 1. The name and qualification of the training director should be included (40 CFR 264.16(a)(2)).
- 2. The actual field training given to familiarize personnel of the location and use of emergency equipment should be included per 264.16(a)(3).
- 3. A more detailed description should be given regarding the training content, frequency of training, and techniques used in training along with a description of an annual review of training (40 CFR 264.16(c) and (d)(3)).
- 4. A discussion should be included in the application showing how the training given to personnel is relevant to the job description listed (40 CFR 264.16(a)(2)).

VIII. Closure Plans and Financial Requirements

- 1. The facility closure plan, as given in the application states that the closure plan will be submitted at least 180 days before the closure is started. This must be corrected to read that the Regional Administrator will be notified at least 180 days prior to the date closure is started. The closure plan itself is a part of RCRA application and becomes an attachment to the RCRA permit.
- 2. The procedure used to decontaminate the storage areas must be described in detail including the following:

- (a) Washing medium
- (b) Solubility of wastes in storage in washing medium
- (c) Identification of parameters and parameter concentration cut-off levels for establishment of effective decontamination
- (d) Sampling and analytical procedures to determine concentration of parameters

The washings must be analyzed and disposed of as dictated by the the results of this analysis (40 CFR 264.178).

- 3. The underground tank also must be included in the closure plan. The cost estimate should be adjusted for this increased storage volume (40 CFR 264.112(a)(2)).
- 4. The application must state the approximate partial/final closure date (if known) (40 CFR 264.112(a)(1)).
- 5. The closure plan must give a detailed schedule of closure outlining various steps and the time taken for each step (40 CFR 264.112(a)(4)).
- 6. Basis for the cost of transportation, treatment and disposal of waste drums must be included.
- 7. Basis for the cost of transportation and disposal of the decontaminating fluid must be provided.
- 8. Cost of sampling and analysis to ensure the effectiveness of decontamination must be included.
- Supervisory and overhead costs must be added to the total cost. This
 may be specified as a percentage of the subtotal cost.
- 10. An administrative cost of 15% must be added to the total cost.
- 11. Closure cost must include the cost of closure certification by a professional engineer.

- 12. The certificate of insurance must have the following:
 - Complete address of the insured
 - EPA I.D. numbers and address of each facility
 - Name, title and address of the authorized representative

	Subject requirement	40 CFR section Mos.	References	Location in application	Comments
C-24	Frequency of Analysis	264.13(b)(4)			
	A description of the frequency at which the analyses will be repeated. For an on-site facility this will be whenever there is a process change or as often as required to verify consistency of the waste feed.				
C-2e	Additional Requirements for Wastes Generated Offsite	264.13(b)(5) 264.13(c)	40 CFR 261, Appendix I; Ref. 8, Ch. 9.5; Ref. 34, Sec. 4.2.3; Ref. 36,		
)	A description of the procedures used to in- spect and/or analyze wastes generated offsite that includes procedures to determine their identity and sampling methods used. Also information supplied by generator.		Sec. 4.0; Ref. 39; Ref. 40, Ch. V; Ref. 41, Part 3; Ref. 42, Part III		
C-21	Additional Requirements for Facilities Handling Ignitable, Reactive, or Incom- patible Waste	264 13(h)(6) 264.17			
	If the facility stores or treats ignitable, reactive, or incompatible waste, a description of methods which will be used to meet the additional waste analsis requirements necessary for complying with the regulatory requirements for these types of hazardous waste.				
ART D	- PROCESS INFORMATION	4.5			
-1 <u>Co</u>	entainers				
0-1a	Containers with Free Liquids				
0-1	a(1) Description of Containers	122.25(b)(1)(1)(A)	Refs. 90-93		
	A description of the facility's primary containment devices that includes basic design parameters, dimensions, material of construction, and compatibility of waste with containers. Information submitted should include:	264. 171 264. 172			
	• Type of container(s) and construction material • Dimensions and useable volume • Liner specifications • Condition of containers • Manufacturer specifications • Determination of compatibility of wastes and containers with description of how compatibility is determined such as trial mixing of waste in containers.				

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Su	bject requirement	40 rrm section Nos.	References	Location in application	Comments
	Container Hanagement Practices A description of container management practices Waste containers are always kept closed during storage, except when adding or removing waste. Containers must not be stored in a manner that may cause them to rupture or to leak. Adequately separated for inspection Aisle space Maximum number, height, volume, and types of containers in storage area tocations of ignitable, reactive, or incommatible wastes	264. 173	References Ref. 90		Comments
D-1a(3)					
	• Design drawing of containment system • Capacity of system to hold spills, leaks, precipitation • Dimensions • Location of storage areas • Liquid collection system and location of sump • Description of base grade and slope • Description of curbs, dikes, berms, ditches, and trenches				
D-1a(3)(a) Requirement for the Base to Contain Liquids				
	The base under the containers must be free of cracks or gaps and sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed. The applicant should address:	264.175(b)(1)	Ref. 90; Ref. 94; Ref. 95		4,
	 Construction and characteristics of base materials Engineering evaluation of base structural integrity Compatibility of base or liner with types of wastes stored 				

Subject	requirement	40 CFR section Nos.	References	Location in application	Comments
	Containment System Drainage The base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, unless the containers are elevated or otherwise protected from contact with accumulated liquids. For this requirement the applicant should address where applicable:	122.25(b)(1)(1)(B) 264.175(b)(2)	Ref. 90; Ref. 96; Ref. 97		
	 Describe handling and stacking practices Grading of base Drainage design and removal system so that standing liquid does not remain on base longer than one hour after a leakage or precipi- tation event. 				
	Containment System Capacity The containment system must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. Information that should be included to satisfy this requirement is:	122. 25(b)(1)(1)(C) 264. 175(b)(3)	Ref. 90; Refs. 96-98	7	
	 Volume of largest container Total volume of containers Containment structure capacity Capacity of run-off collection system Geographic storm intensity/ frequency data 				
	Control of Run-on Run-on into the containment system must be prevented, unless the collection system has sufficient excess capacity in addition to that required in the above paragraph to contain any run-on that might enter the system. The applicant should discuss structures used to control run-on such	122.25(b)(1)(†)(D) 264.175(b)(4)	Ref. 90; Ref. 94; Ref. 95; Ref. 98		

' Subject requirement		40 CFR section Nos.	References	Location in application	Comments	
	Containment system auxiliary structures (curbs, dikes, etc.) Engineering grading design Collection and removal system design capacity Potential run-on Demonstration that system has adequate capacity to handle run-on from precipitation event in addition to 10% of the volume of containers or the largest container whichever is greater.		•			
0-1e(4)	Removal of Liquids from Containment System	122.25(b)(1)(f)(E) 264.175(b)(5)	Ref. 34; Ref. 35; Ref. 90; Ref. 97			
	Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in a timely manner to prevent overflow of the containment system. Information that should be included when describing removal of accumulated liquids is:					
	 How liquids will be analyzed Removal equipment and methods (sump pump design, piping specifications, location, discharge point and capacity) Management of accumulated liquid including prevention of overflow 					
1b Cont	ainers Without Free Liquids					
D-1b(1)	Test for Free Liquids For areas that store containers of wastes that do not contain free liquids, the test procedures and results or other documentation or information showing that the wastes do not contain free liquids.	122. 25(1)(1)(11)(4)	40 CFR 265.314 Federal Register 8311 February 25, 1982			
D-1b(2)	Description of Containers A description of the facility primary containment devices that includes basic design parameters, dimensions, materials of construction, and demonstration of compatibility of waste with containers. Information submitted should include:	264. 171 264. 172	Refs. 90-93			

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Sc	ubject requirement	40 CFR section Nos.	References	Location in application	Comments
)	• Types of container(s) and construction material • Dimensions and useable volume • Liner specifications • Container condition • Manufacturer specifications • Determination of compatibility of wastes and container with description of how compatibility is determined such as trial mixing of waste in containers				
D-1b(3)	Container Management Practices A description of container management	264.173	Ref. 90		
	Practices: Naste containers are always kept closed during storage except when adding or removing waste. Containers are not opened, handled, or stored in a manner that may cause the container to rupture or to leak Adequately separated for inspection. Aisle space. Maximum number, height, volume, and types of containers in storage area tocation of ignitable, reactive, and incompatible waste.				
D-1b(4)	Container Storage Area Drainage The storage area must be sloped or otherwise designed to drain and remove liquid resulting from precipitation Design drawing showing location of hazardous waste and dimensions Description of stacking practices Base slope Brainage design and removal system	122.25(b)(1)(11)(B) 264.175(c)	Ref. 90; Ref. 96; Ref. 97		
D-2a Desc	ription of Tanks	122.25(b)(2)	Ref. 23; Ref. 24; Ref. 26;		
A reassurer review review representations of the second representations of the second representation representa	view of tank design specifications to re that the tanks will not collapse upture. The specifications to be ewed include shell strength, capacity, sure controls, foundation, structural ort, and seams sufficient to demonstrate tank will not collapse or rupture. Ifically the applicant should address items as:	264. 191	Ref. 27; Ref. 28; Ref. 29 Ref. 99		

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	Subject requirement	40 CFR section Nos.	References	Location in application	Comments
	Types and number of tanks Tank wall thickness Tank internal pressure and pressure controls Foundation construction, specifications, and structural supports Tank design specifications including				
)	dimensions, capacity, design, shell thick- ness, material and method of construction Tank design standard code and year Specifications on seams Operating pressure and temperature Type of waste contained in tanks Specific gravity of tank liquids Maximum height of liquid level				
- 2 b	Tank Corrosion and Erosion A review of the pertinent characteristics of the tank construction material and lining materials to determine corrosion or erosion effects with wastes and other materials (i.e., treatment reagents). The applicant should also address:	122.25(b)(2)(11) 264.192(a)	Ref. 91; Ref. 99		
	 Description of lining and coating materials Corrosion allowance and corrosion and erosion rates. Demonstration of how minimum shell thickness will be maintained Tank construction compatibility with waste and tests or documentation to substantiate compatibility Description of treatment reagents 				
) ^{2c}	Tank Management Practices A description of the tank owner's or operator's operating practices and controls:	122.25(b)(2)(1v) and (v) 264.192(b)	Ref. 99		
	Description of controls to prevent over- filling and overtopping such as waste feed cut-off system(s), by-pass or standby tank Demonstration of maintenance of sufficient freeboard to prevent overtopping by wave or wind action or precipitation for uncovered tanks Tank process flow and piping diagrams Description of tank instrumentation such as pressure, temperature, pH, level gauges and monitors Description of safety devices such as rupture discs and safety vents Description of pollution control devices such as vapor recovery systems				

TECHNOLOGY FOR THE STORAGE OF HAZARDOUS LIQUIDS

A State-Of-The-Art Review

NEW YORK STATE

DEPARTMENT OF ENVIRONMENTAL CONSERVATION DIVISION OF WATER BUREAU OF WATER RESOURCES

ALBANY, NEW YORK

JANUARY 1983

1. Pneumatic Testing

Air pressure (pneumatic) tests can be performed when: (1) non-flammable liquids are stored; (2) water or other suitable liquid is unavailable; and (3) water in the tank may contaminate the product stored. Air testing should be avoided if the tank is badly corroded [3]. Low-pressure storage tanks as well as atmospheric tanks can be tested with this method except that low-pressure tanks are tested at slightly higher pressures (i.e. up to

15 psig.), depending upon their design [3].

The primary disadvantage of pneumatic tests is that they are not sensitive enough to detect slow leaks and their precision is limited by the readings of a stick gauge and the amount of product in the tank. Greater accuracy can be achieved, however, when the tank is full or nearly full. Air pressure varies greatly with temperature and also with the vapor pressure of the liquid stored in the tank. Pneumatic tests are extremely hazardous and their use should be discouraged. There has been a fatality from pneumatic testing: a faulty gauge led to overpressurization and explosion of a tank. NFPA 329 states that "pressure tests with air shall not be used on tanks." [8]

Another important drawback of the pneumatic testing method is that large amounts of product may be forced out of the tank during the test without detection. For example, a 6000 gallon tank half-full with product and pressurized to 5 psig with air would lose over 78 gallons of product before a 0.5 psi loss in pressure can be detected. Pneumatic tests are not capable of compensating for thermal expansion or contraction that may mask large leaks. They may even cause a leak by overpressurizing the tank. Air pressure is acceptable for piping tests, however, and it is routinely used at levels of 50 psig with no adverse effects on sound piping systems. OSHA regulations require air pressure testing of submerged transfer pump piping every five years at maximum operating pressure.

2. Hydrostatic (Standpipe) Testing [6]

Hydrostatic tests involve pressurization of a storage system by connecting a standpipe to a completely filled tank. An additional head is placed on the tank by filling the standpipe, generally to an elevation such that a pressure of 5 psi is exerted at the bottom of the tank. A leak is detected by observing a drop of the liquid level in the standpipe. The magnitude of the leak can be determined by measuring this level drop. Hydrostatic tests are more accurate than pneumatic tests, but they still contain several sources of error. The expansion of the tank due to the pressure exerted during the test produces an apparent loss of product. The magnitude of this apparent loss depends on the tank deflection and can be substantial. Table 2.6-2 shows the magnitude of this loss for varying deflections on a given size tank.

The procedure will be useful where it is desired to test an underground storage tank and its connected piping for gross leaks. It is not adequate for detecting slow leaks nor for determining that a tank system is tight.

Often water is substituted for the product stored in the tank. However, water is more viscous than many hazardous substances (gasoline, light oils, etc.), and thus will leak out at a slower rate. This will bias the measurement of the actual leak rate.

Hydrostatic tests do not compensate for thermal expansion or contraction of the test liquid as it exchanges heat with the tank and surrounding soils. If the test liquid is colder than the stored product, it will expand when heated and thereby raise the level in the standpipe. This will also bias the level measurements on which the test is based. For example, if the contents of 6000 gallon tank are warmed 2°F, there will be a 7.2 gallon increase in volume. If the hydrostatic test is run for 2 hours, a leak of almost 90 gal/day will not be detected because no change in liquid level will occur.

In situations where an underground storage tank can be removed from service for several days, a hydrostatic test in which the test liquid is allowed to reach thermal and mechanical equilibrium with the tank can be very sensitive in detecting small leaks. The ability to isolate and test a tank over a period of several days may be likely in an industrial storage situation, whereas it may be impractical in testing gasoline service station tanks. Increased accuracy is available from hydrostatic testing where a long time period can be employed to permit reaching equilibrium conditions.

3. The Heath Petro-Tite Tank and Line Testing Systems (Kent-Moore Test) [15,16]

The Kent-Moore test is essentially a hydrostatic test that compensates for temperature, pressure and viscosity variation. This enables leaks as small as 0.05 gal/ hr to be readily detected. The Kent-Moore test consists of exerting a pressure head on the tank by means of a standpipe filled with the same liquid stored in the tank. This eliminates the error introduced by using a liquid of different viscosity. A pump is used to circulate the liquid in order to produce a uniform temperature throughout the tank. Using a thermal sensor, the temperature changes are precisely measured to account for expansion and contraction of the liquid. The volumetric measurements are then correspondingly adjusted for the changes in temperature. The Kent-Moore test includes a means of accurately measuring all product added or removed from the standpipe in order to maintain a constant head. By comparing the product added or drained with the volumetric changes anticipated due to temperature changes, it is possible to reliably detect a leak as small as 0.05 gal/hr.

For storage systems with submerged pumping, the Kent-Moore test must be run separately on the tank and

on the piping to give good results. On suction delivery storage sytems, the Kent-Moore test checks the entire system simultaneously.

The Kent-Moore test requires several hours for completion with accurate results. Generally, during he first few hours of such a test there is a drop in the standpipe level attributed to the tank expanding because of the increase in internal presure. This is compensated for by reducing the tank pressure after 2 hours to control tank expansion. It has been determined by experimentation and field testing that by reducing the tank pressure after 2 hours further tank expansion does not take place. The Kent-Moore test can usually be completed in one working day. However, it is a relatively difficult test which must be performed by a skilled technician.

Because of the extensive shut-down time requirements and the level of skill involved, the Kent-Moore test is relatively expensive to perform.

4. The J-Tube Manomenter Test [15,16]

The J-tube leak detector developed by the Ethyl Corporation and field-tested by Texaco is essentially a manometer-type instrument that is capable of measuring very small drops in product level caused by tank leakage. The J-tube consists of a large diameter leg and a small-diameter leg that cause a magnification of an liquid level change as shown in Figure 2.6-1a. The detector can be placed in a tank through a 3-inch or larger fill-pipe, and the valves can be operated while the detector is in the tank. When placed in the underground tank, the detector primes as shown in Figure 2.6-1c. If the liquid level in the tank drops during the test period, the indicator fluid will be displaced as shown in Figure 2.6-1d. The ratio of the change in the indicator level to the change in the liquid level of the tank is the magnification factor and a measure of the rate of leakage. The lower valve is closed and the reservoir valve is opened just before removing the detector from the tank. This locks the indicator fluid in place while the leak detector is removed from the tank and a reading obtained as shown in Figure 2.6-1e.

The J-tube leak detector will detect leaks that cause variations in tank product level as small as 0.02 inches [7]. For a one-hour test with the product level in the middle of an 8,000 gallon tank, a change of 0.02 inches reflects a leak rate of 2.12 gallons per hour. Accuracy is dependent on the time span of the test. If, in the example above, the time span had been for a period of 10 hours instead of one hour, the leak rate would be 0.212 gallons per hour.

Possible effects of temperature and tank-end deflection variables are reduced by careful adherence to the test procedure. Instructions on the use of the equipment state that 1°F change in product temperature during the test will negate the results. Therefore, tests conducted within 24 hours after delivery should be avoided be-

cause temperature sometimes varies within that period. When the leak test is begun 24 hours or more after a delivery, the temperature usually does not vary 1°F from the beginning to the end of the test.

Also, temperature has been found to be stable at various depths from the top to the bottom of the tank. Rejection of any test with a 1°F temperature change means that error due to temperature is kept within small limits. For example, the error in 4,000 gallons of gasoline would be less than 2.4 gallons, or in 2,000 gallons of gasoline would be less than 1.2 gallons.

Tank-end deflection is not regarded as a serious problem because no unusual pressure is applied to the tank and also because the tank has at least 24 hours to physically stabilize in the ground before the leak test starts.

Advantages of the Texaco J-tube leak detector are:

- It is relatively easy to transport, assemble and operate.
- It does not intensify existing leaks or create new leaks, since no hydraulic or air pressure is used.
- Accuracy is a function of the time span of the test. The euipment will measure major leaks in a short period of time and relatively minor leaks in a longer period of time.
- It does not require a contractor crew to operate and no tank truck delivery is required.
- •Several tanks can be tested simultaneously.
- Underground tank, piping and dispenser openings need not be sealed.

One disadvantage of the J-tube leak detector is that it will not detect leaks above the product level in the storage tank.

While the J-tube leak detector was developed primarily for fuel storage tanks, it can be applied with other liquid products as well.

5. The Sunmark Leak Detection Test [8,9,10]

The Sunmark Industries Leak Lokator is an equipment system capable of detecting and measuring volume changes in underground storage systems. It was principally developed for use on gasoline storage tanks but could be used for other liquid storage systems as well. The equipment is capable of differentiating between piping leaks and tank leaks.

The basic equipment consists of a sensor, an analytical balance, and a chart recorder. The sensor is an open top, hollow tube filled with the liquid contained in the tank. It is suspended from the analytical balance and partially submerged in the tank liquid. As the liquid level in the tank changes, the buoyancy of the sensor also changes. This change of mass displacement measured by the analytical balance is an indication of volume changes within the tank. The chart recorder provides a graphical representation of volume change versus time.

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